

JOURNAL
OF THE
ROYAL MICROSCOPICAL SOCIETY.
AUGUST, 1879.

TRANSACTIONS OF THE SOCIETY.

XXVI.—On a New Species of Excavating Sponge (*Alectona Millari*); and on a New Species of *Rhaphidotheca* (*R. affinis*).

By H. J. CARTER, F.R.S., &c.

(Read 11th June, 1879.)

PLATES XVII. AND XVIIa, FIGS. 1-4.

AT the request of Dr. Millar I undertake the description of these sponges respectively, prefacing the former with his own observations, which are as follows:—

“In the month of May last, while looking for sponges on a piece of *Amphihelia oculata* given to me by Dr. Duncan, I noticed on it numerous small, cribrate, flattish papillæ, of a pale pinkish colour, slightly raised above the surface, which, when detached and examined microscopically, were found to be almost entirely composed of spicules so like those of a *Gorgonia* that, until tried with acid, I could not be convinced of their siliceous composition. Seeking for the form of the largest ones in the late Dr. Bowerbank's ‘Monograph of the British Spongiadæ,’ I found them to correspond with the spicule figured in No. 245,* which Dr. Bowerbank believed ‘to belong to a sponge not yet identified.’

“Having in vain attempted to extricate one of these papillæ

EXPLANATION OF PLATE XVII.

FIG. 1.—*Alectona Millari*, n. sp. Longitudinal section of branch of coral of *Amphihelia oculata*, Dune, showing:—*a a*, excavated portion occupied by the Sponge; *b*, cribriform papilla; *c c*, minute processes.

FIG. 2.—The same. Cribriform papilla, more magnified.

- | | | |
|-------|---|------------------------------------|
| ” 3.— | ” | Skeleton-spicules. |
| ” 4.— | ” | Subskeleton-spicules. |
| ” 5.— | ” | Varieties of subskeleton-spicules. |
| ” 6.— | ” | Flesh-spicules. |
| ” 7.— | ” | Larger variety of flesh-spicules. |

* Vol. i. pl. xi.

by mechanical means, I subjected a portion of the coral bearing one to the influence of acid, when the papilla above mentioned was not only eliminated in a perfect state, but numerous brown points made their appearance at various depths from the surface of the coral, which, as the latter became entirely dissolved by the acid, were, together with the cribrate papilla, found to be processes of membranous, cellular sarcode, presenting a brown colour (in its dried state), which lined the centre of the coral, now reduced by excavation from solidity to a mere shell in many parts. These 'processes' which were conical and thus engaged in excavating the coral, might also, on reaching the surface, grow into the form of cribriform papillæ if necessary.

"As the sponge appears to be nearly allied to *Gummina Wallichii** recently described and illustrated by Mr. Carter, which he informs me has therein by mistake been called '*Corticium*,' I do not think I can do better than hand it over to him for technical record."

Having thus premised Dr. Millar's remarks on his discovery, I now proceed to comply with his request.

Alectona † *Millari*, Crtr. n. sp.

Amorphous, excavating, membranous, cellular, consisting of simple, fibreless sarcode (now, i. e. in its dried state, brown and gum-like), charged with the spicules of the species and projecting outwardly, in processes of different forms and different degrees of length, until some reach the surface, where they appear like flattened papillæ. "Processes" of two kinds, viz. those which form papillæ on the surface, which are comparatively large, and those which extend more or less into the substance of the coral, which are minute. Papillary processes of two forms, viz. one with an irregularly circular, more or less flattened, cribrate head, in which the spicules of the species, imbedded in sarcode, produce a cribriform structure dividing the area of the head into a variable number of minute apertures, each of which in all probability, when fresh, is provided with a delicate sphinctral diaphragm of sarcode (Pl. XVIIa, Figs. 1 and 2); and the other, with a conical head in which the spicules are arranged radiatingly, so that when retracted in the living state, a *single* large aperture only would be presented. Each form of the papilla when largest, about $\frac{1}{24}$ inch in diameter, but variable, down to $\frac{1}{25}$ inch with holes in the latter correspondingly small, viz. $\frac{1}{1800}$ to $\frac{1}{1800}$ inch in diameter. Minute conical processes or points engaged in excavating the coral, but all charged to the extremity with spicules of the species,

* 'Ann. and Mag. Nat. Hist.,' vol. iii. 1879, p. 353.

† *Alecto*, one of the Furies.

especially the largest, which will be described presently, Fig. 1, *c c*. Pore-areæ represented by the cribriform, and vents by the conical papillæ respectively. Spicules of four forms, viz. 1, the largest or skeleton-spicule, acerate, abruptly curved or rather bent in the middle, covered with tubercles arranged linearly and longitudinally in twelve rows; tubercle simply conical, or divided into two or more portions at the extremity, arranged alternately in adjoining rows extending over the ends of the shaft, so as to render the latter obtuse and irregular; medullary canal angular in the centre and more or less undulating throughout; skeleton-spicule about $\frac{1}{72}$ by $\frac{1}{900}$ inch in its greatest dimensions (Fig. 3); 2, sub-skeleton-spicule, acerate, also abruptly curved or bent in the centre, more or less obtusely pointed at the ends, sparsely covered with tubercles irregular in number and situation, sometimes absent altogether, about $\frac{1}{200}$ by $\frac{1}{4000}$ inch in its greatest dimensions, but very variable in all respects (Figs. 4 and 5); 3, acerate undulating, almost immeasurably fine, hair-like, with an enlargement in the centre barrel-shaped, inflated in the middle and at the ends respectively, about $\frac{1}{300}$ inch long; 4, flesh-spicule, consisting of a straight microspined shaft, interrupted in its course by two circles of tubercles equidistant from the extremities and from each other, about $\frac{1}{1000}$ inch long, but very variable in size, and in number and disposition of the tubercles (Figs. 6 and 7). Spicules scattered more or less generally throughout the sarcose of the sponge, where they appear to be chiefly congregated, especially the larger ones, in the projecting processes. Size indefinite, extending in this instance throughout the main stem and branches of the specimen of *Amphihelia oculata* which is about $5\frac{1}{2}$ inches long and 2 inches in transverse diameter, the thickest branch being $\frac{3}{4}$ inch in diameter.

Hab. Marine, in the coral of *Amphihelia oculata*, Duncan.

Loc. North Atlantic Ocean, between N. of Scotland and Faroe Islands ('Porcupine,' 1869, Sta. 54); lat. N. $59^{\circ} 56'$; long. W. $6^{\circ} 27'$; depth, 363 fathoms; bottom temp. $31^{\circ} 4'$.

Obs. Examined in the dried state. This evidently is a variety of, if not the same species as *Gummina Wallichii* (*mendose scrip.* "*Corticium*" *l. c.*) under a slightly different form of spiculation, of which species it is stated* that "further observation" could only determine its real nature, as so little of it had been obtained, that this could not then be even satisfactorily inferred. Curious enough, this had hardly been published before Dr. J. Millar found the specimen above described in *Amphihelia oculata*, which is so like *Gummina Wallichii* that no doubt can be entertained of the latter belonging to the "excavating sponges," and that, too, to one of the most devastating kinds that I have met

* Page 354 *op. cit l. c.*

with. Were we only to see a fragment of the brown substance from the interior of the coral in its *dried* state, the homogeneous, fibreless character of the then gum-like sarcode, although charged with spicules, might induce one to think that it belonged to the Gummida, and so, provisionally, I called the species described in the 'Annals' (*l. c.*) *Gummina* (*mendose, Corticium*) *Wallichii*; but Dr. Millar's discovery undoubtedly proves it to be an "excavating sponge," so the generic name "*Gummina*" will still have to be changed to meet this in the way that will presently be mentioned.

The spiculation in *Alectona Millari* (it is the only form that I can give to "*Alecto*," which has been so often used, and as often transformed, for other things), is somewhat different from what I have figured of *Gummina Wallichii* (*l. c.*), and these differences are as follows:—In the skeleton-spicule (No. 1) the tubercles are conical or divided at the extremity, and not smooth, round, inflated, flattened and undivided as in *G. Wallichii*; while the earlier untubercled form of this spicule (pl. xxix. fig. 6, *op. et l. c.*) coming so near in size to the large tubercled form, I have not seen in *A. Millari*; but there are much smaller ones, viz. No. 2, that might stand for this, and amongst these every grade in form between the large skeleton-spicule No. 1 and the minute flesh-spicule No. 4. So that when compared with the spiculation of *Gummina Wallichii* as a standard, the whole of the former, characterized by their extreme variability, can only be considered as derivative from the latter, and hence my opinion that *Alectona Millari* is only a variety of *Gummina Wallichii*.

At last, then, the nature of this sponge has been discovered, whose singularly beautiful skeleton-spicules created such a desire to know their origin; and thus, as just stated, it becomes necessary to change the name "*Gummina*" to the generic one of "*Alectona*." With this, too, it seems desirable, now that three distinct genera of "excavating sponges" are known, the whole should, from this distinguishing peculiarity, be placed under one family, to which hereafter it is very possible that more may be added. To effect this I would propose the following classification, viz.:—

Order VI. HOLORHAPHIDOTA.

Family. *Eccælonida*.*

Char. Sponges burrowing in hard calcareous objects, organic and inorganic, communicating with the exterior through small fenestral openings; sarcode fibreless, but spiculiferous.

Gen. 1. *Cliona*, Grant, 1826.

Possessing a pin-like spicule, with or without subskeleton and flesh-spicules. Flesh-spicule sinuous, smooth, or microspined.

* *ἐκκοιλῶναι*, to hollow out.

Gen. 2. *Thoosa*, Hancock, 1849.

Form of skeleton-spicule undetermined (? "multifid"). Flesh-spicule nodular, consisting of a stout shaft, terminated at each extremity by a globular inflation, and encircled by two rings of similar inflations equidistant from the extremities respectively and from each other.*

Gen. 3. *Alectona*, Crtr., 1879.

Skeleton-spicule acerate, abruptly curved or bent in the centre, tubercled throughout. Flesh-spicule spindle-like, consisting of a straight shaft, pointed at the extremities and encircled by two rings of tubercles equidistant from each other and from the ends of the shaft respectively.†

It is not improbable that *Samus anonyma*‡ may have to come in as a fourth genus.

Lastly, I would observe, with reference to *Alectona Millari*, that on one part of the specimen of *Amphihelia* was an irregular mass about two lines in diameter horizontally, and $\frac{1}{2}\frac{1}{4}$ inch high, opaque and cream-coloured, looking very much like a bit of *Aleyonium*, especially from the form of its spicules when viewed under the Microscope, but which, on the application of acid, proved to be entirely siliceous and identical in spiculation with *A. Millari*. Thus, *A. Millari*, like *Cliona celata*, may leave its burrows and grow up externally into a massive form.

The papilla, too, may be represented by a solid mass or plug of spicules, when it appears to have become effete, and the whole mass externally, composed of sarcode charged with spicules of the species mixed with, and finally faced by foreign material, i. e. quartz-sand, with a slight admixture of carbonate of lime, which causes it to effervesce under the influence of acid; thus entirely devoid of pores or passages.

Rhaphidotheca, Kent, 1870.

(‘Ann. and Mag. Nat. History,’ vol. vi. p. 222, pl. xv.)

Rhaphidotheca affinis, n. sp.

Another sponge found and recognized by Dr. Millar upon this specimen of *Amphihelia oculata* is similar to that described and illustrated by Mr. Saville Kent,§ which came from a specimen of a like kind, viz. *Lophohelia prolifera*; that is, it consists of an

* See Hancock's figure and description, ‘Ann. and Mag. Nat. History,’ 1849, vol. iii. p. 346, pl. xii. figs. 2, &c.; also *ibid.*, 1879, vol. iii. pl. xxix. fig. 21.

† *Ibid.* *ib.*, p. 353, pl. xxix. figs. 5-9, *Corticium*, now *Alectona Wallichii*.

‡ *Ibid.* *ib.*, l. c. p. 350, pl. xlix. fig. 1, &c.

§ *Op. et l. c.*

Esperia faced by a crust of pin-like spicules arranged perpendicularly to the surface of the *Esperia*, with their heads outwards and their pointed ends struck into the dermal layer of the latter like pins into a pin-cushion, so that these spicules appear to have been appropriated by the *Esperia* itself, as I have before stated.* But the fragment found by Dr. Millar not being more than one-third of an inch in diameter, and very imperfect, does not afford sufficient character for a description of the general form of the sponge, although the details are quite enough to prove that it is what I have stated. Herein, however, consists the most important part, for the heads of the pin-like spicules and the anchorates respectively are different in form from those of *Rhaphidotheca Marshall-Hallii* Kent.† Thus, the head of the former is flask-shaped elongate (Plate XVIIa, Fig. 1), while that of *R. Marshall-Hallii* (Fig. 2) is globular oblate;‡ and the small end of the inequianchorate comparatively longer and truncate (Fig. 3), not round and comparatively shorter as in that of *R. Marshall-Hallii* (Fig. 4).§ In every other respect *R. affinis* is almost identical with *R. Marshall-Hallii*, as slight differences in the size of spicules, such as may be found in the larger bihamates of *R. Marshall-Hallii*, go for nothing in specific distinction; while the head of a pin-like spicule and the form of an inequianchorate often vary much, even in the same individual. Still, the differences in the form of the anchorate here seem to me to be sufficient to constitute a variety, if not another species of *Esperia*, and hence I have designated it "*affinis*"; while the difference in the heads of the pin-like spicules respectively, still further strengthens this view. The pin-like spicule and anchorate of *R. Marshall-Hallii* from a fragment of the type-specimen, are figured in the Plate by the side of those of *R. affinis* for comparison.

As, however, the form of the pin-like spicule both of *R. Marshall-Hallii* and *R. affinis*, especially as regards its head, has, with much search, not yet been found in any sponge possessing a pin-like spicule, either as a *Cliona* about the specimen of *Amphihelia*, or elsewhere, it becomes questionable whether the difference has not been produced by the *Esperia* after these spicules had been appropriated; for the sarcode has the power of producing such changes by the addition of more siliceous material in Sponges where the spicules themselves have been produced.

Still the value of Mr. Kent's record now becomes evident, for what he has stated Dr. Millar has found to be repeated in another species, and therefore it may fairly be inferred that other instances of a like nature may follow.

As regards the absence of the sinuous flesh-spicule in *R. affinis*, while it is present in *R. Marshall-Hallii*, this does not militate

* 'Ann. and Mag. Nat. Hist.,' 1878, vol. i. p. 170.

† *Ibid.*, 1870, vol. vi. pl. xv.

‡ *Ibid.*, *l. c.* fig. 6.

§ *Ibid.*, *l. c.* fig. 7.

against the probable *appropriation* of these spicules; while the presence of the *Esperian* rosettes in *R. affinis* (where they are abundant), and their absence in *R. Marshall-Hallii*, is met by the facts—first, that when inequianchorates have attained their full development in the rosettes, the latter break up and they are dispersed; and second, the statement of Dr. Bowerbank that, wherever there are *inequi*-anchorates there may or may not be rosettes.

EXPLANATION OF PLATE XVII^a. FIGS. 1-4.

FIG. 1.—*Rhaphidotheca affinis*, n. sp. Pin-like spicule. Scale $\frac{1}{2}$ to $\frac{1}{1600}$ inch.

FIG. 2.—*R. Marshall-Hallii*. Pin-like spicule. Same scale.

FIG. 3.—*Rhaphidotheca affinis*. Inequianchorate. *a*, front view; *b*, lateral view. Same scale.

FIG. 4.—*R. Marshall-Hallii*. Inequianchorate. *a*, front view; *b*, lateral view. Same scale.

N.B.—The pin-like spicule and inequianchorate of *Rhaphidotheca Marshall-Hallii*, drawn from a fragment of the type-specimen, are introduced here for comparison.
